

Sustainable Cotton Project - Implementing Management Practices to Reduce Pesticide and Fertilizer Use on Cotton Crops in the Upper San Joaquin Valley

Biological Agriculture Systems in Cotton (BASIC) is an agricultural pollution prevention project administered by the Sustainable Cotton Project (SCP). BASIC reduces pollution of ground and surface waters by assisting cotton farmers seeking to reduce or eliminate their use of damaging chemicals, through a farmer-to-farmer mentoring program. The project goals included: conversion of cotton acreage in the Northern San Joaquin Valley to BASIC management practices, reductions of insecticide and miticide use, including chlorpyrifos and all insecticides and miticides that are toxic to fish and wildlife, and reduction of synthetic fertilizers.



BASIC growers plant habitat along field edges to provide food and shelter for beneficial insects that prey and feed on pest insects in the cotton plants.

Problem: Cotton is an important fiber crop in California, grown on roughly 1,400 farms – almost 700,000 acres, according to the California Agricultural Statistics Service. Nearly 7 million pounds of chemicals are applied annually to this acreage. Significant portions of these chemicals are toxic insecticides, herbicides, and chemical fertilizers, which may trigger public concern. The tremendous population growth in California’s Central Valley is bringing pressure on California’s farmers to be good neighbors and better stewards of the land.

The BASIC program has shown that a significant fraction of the chemicals applied to cotton can be eliminated through better management of the crop and soil. Use of crop rotations, cover crops, conservation tillage techniques, and the addition of compost to the soil all have positive effects on plant health and improve the long-term viability of the soil resource. These practices also increase water penetration into the soil, build the soil’s water holding capacity, and improve the quality of the water that runs off these soils.

The San Joaquin River, Delta, and some tributaries were listed on the 2002 303d list of impaired waterways for the organophosphate pesticides - diazinon and chlorpyrifos. This project was designed to reduce water quality threats to ground and surface waters in the Northern San Joaquin Valley by providing cotton growers with information on best management practices which help reduce the use of farm chemicals identified as water pollutants, including organophosphate pesticides. BASIC helped build a significant base of knowledge among farmers, pest control advisors, and others in the affected region.

Project Highlights: The project timeframe was 2001-2004. The project served cotton growers representing over 2400 acres in three Central Valley counties: Fresno, Madera and Merced Counties. The primary project highlights included: conversion of cotton acreage in the Northern San Joaquin Valley to BASIC management practices, and reductions of insecticide and miticide use, including chlorpyrifos and all insecticides/miticides that are toxic to fish and wildlife and reduction of synthetic fertilizers.



Habitat planted along road edges will protect the cotton crop from the dust of passing vehicles, which will reduce mite damage.

Other highlights included:

- Continue coordinating and expanding BASIC program to the Northern San Joaquin Valley by recruiting growers into the program
- Provide technical support to BASIC program growers
- Conduct outreach and education to the cotton grower community regarding BASIC management practices
- Scientifically document and evaluate changes in biodiversity, volumes of toxic chemical release, and economic performance as a result of BASIC management practices
- Conduct on-farm tests of new methods designed to further reduce the use of toxic herbicides and synthetic fertilizers

BASIC as a system is built on Integrated Pest Management (IPM) practices developed through 30 years of research supported by the cotton industry and public institutions. The key to BASIC is bringing together all the parties to implement and demonstrate these strategies in a participatory process. This process and commitment is the unique contribution of BASIC.

The BASIC system incorporates biointensive IPM practices by building on existing IPM practices, but takes the system farther by better integrating ecological and economic factors into the cropping system. Benefits include: reduced environmental impacts, decreased costs of inputs, and more sustainable pest management systems.

The Consumers Union defines biointensive IPM as the highest level of IPM. “Biointensive IPM is a systems approach to pest management based on an understanding of pest ecology. It begins with steps to accurately diagnose the nature and source of pest problems, and then relies on a range of preventative tactics and biological controls to keep pest populations within acceptable limits. Reduced-risk pesticides are used if other tactics have not been adequately effective, as a last resort, and with care to minimize risks.” (Benbrook. 1996).

Results:

Grower Enrollment Increased - Grower enrollment steadily increased over the three growing seasons (Table 1). Over 70% of the original 23 growers have remained with the project through 2004. This highlights the importance of on farm demonstration projects that support growers interested in making changes and assists them in implementing best management practices on their farms.

Table 1. Number of growers in the BASIC program 2002-2004

Year	BASIC Growers	Organic Growers	Total Enrolled
2002	21	2	23
2003	29	1	30
2004	40	0	40

Mentor Grower Support Increased - The BASIC program utilizes a mentor grower system of farmer-to-farmer information exchange. Mentor growers are program growers who are willing to provide technical support both to program staff and to other local growers. They make phone calls or personal visits and speak about the program in their local communities. In 2004 the number of mentor growers reached 11 as the program grew and local farmers gained expertise. These growers were “on call” to respond to other growers questions or concerns and many of the mentor growers had trials on their farms which to implement alternative practices.

Acres Under BASIC Program Influence Increased - As the number of growers in the program grew, so did the acres of cotton enrolled in the program. Table 2 below shows the acres enrolled in the program over the three year period. It is important to note that cotton acreage fluctuates with the market. Acres planted in cotton are a direct result of available markets and grower price supports. Some growers choose to not plant cotton in years with a poor economic outlook. Additionally, cotton is often managed with a 3-year tomato-grain-cotton rotation. Particular fields planted to cotton will be rotated to these other crops.

Table 2. Acres of cotton in the BASIC program.

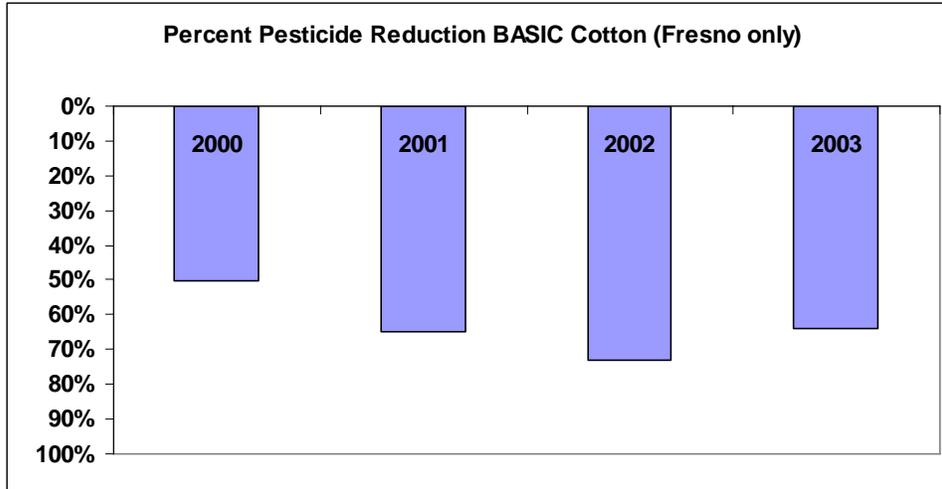
Year	Total acres enrolled	Total acres of cotton farmed by BASIC growers
2002	1,029	15,265
2003	1,827	14,982
2004	2,484	17,753

Pesticide Use Reduction by BASIC Growers - During 2002, BASIC farmers reduced their use of 11 targeted pesticides by 73% compared to the county average. Even on non-enrolled acreage, BASIC farmers used about half the amount of the targeted pesticides, compared to the county average. Again in 2003, BASIC growers were able to demonstrate a significant reduction of the 11 targeted pesticides by 65% compared to the county average. The list of targeted pesticides for program use includes: aldicarb, avermectin, carbofuran, chlorpyrifos, diazinon, dicofol, glyphosate, naled, profenofos, prometryn, propargite, and trifluralin.

Pesticide use analysis summary for all tracked pesticides used by BASIC enrolled cotton growers on their enrolled and non-enrolled cotton acreage in 2003.

Lbs AI used in 2003 Active Ingredient (AI)	All cotton in Fresno	BASIC Growers			Growers Sum (lbs)	BASIC Enrolled Fields			Enrolled Sum (lbs)
		Fresno	Merced	Madera		Fresno	Merced	Madera	
ALDICARB	74,553	1,280	125.3	0.0	1405.2	101.3	17.3	0.0	118.6
AVERMECTIN	1,006	22	6.9	0.2	29.3	4.4	0.2	0.0	4.6
CARBOFURAN	927	12	0.0	0.0	12.3	0.0	0.0	0.0	0.0
CHLORPYRIFOS	119,699	1,494	0.0	0.0	1494.2	250.2	0.0	0.0	250.2
DIAZINON	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DICOFOL	46,120	453	100.8	0.0	553.5	0.0	0.0	0.0	0.0
GLYPHOSATE	178,720	6,935	1502.5	1074.7	9512.3	1,145.5	61.1	229.4	1436.0
NALED	53,605	644	0.0	0.0	644.5	0.0	0.0	0.0	0.0
PROFENOFOS	4,780	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PROMETRYN	73,304	624	0.0	0.0	623.7	31.4	0.0	0.0	31.4
PROPARGITE	33,362	588	0.0	635.8	1223.5	0.0	0.0	0.0	0.0
TRIFLURALIN	46,869	786	183.8	524.0	1494.0	132.7	0.0	62.7	195.4
Grand Total	632943.4	12838.4	1919.3	2234.7	16992.4	1665.6	78.6	292.1	2036.2
Acres Planted	274229.2	7335.2	2626	1889	11850	1125	151	245	1521
Number of fields	2807	82	70	27	179	14	6	4	24
Lbs. AI/ acre planted	2.3				1.4				1.3

If all cotton growers in Fresno could use these pesticides at the rate used by BASIC growers, a county-wide reduction in these pesticide active ingredients would equal about 250,000 lbs per year. However, this reduction in pesticide use would have to be accompanied by an increase in BASIC-type management practices that reduce the need for these pesticides.



Percent reduction of tracked pesticide active ingredients used on all BASIC enrolled cotton acreage compared to the Fresno County average.



Cotton harvest at a BASIC field.

Partners and Funding: A private nonprofit, the Sustainable Cotton Project has been funded over the past three years by the California State Water Resources Control Board. This funding has enabled the Sustainable Cotton Project to coordinate with participant growers, pest management consultants, University of California Cooperative Extension, and Agricultural Experiment Station researchers to bring biointensive management practices and proven BASIC techniques to California cotton. BASIC is a voluntary, community-based program for cotton growers that helps farmers develop tools that will allow them to not only reduce inputs, but save money. These tools include biological control systems, intensive regular crop monitoring, and information sharing

and on farm trials. The project has received support from State Water Resources Control Board, CALFED, and private foundations. The State Water Board funded a 319h grant for this project for \$349,482. The SWRCB 319h grant funded the project from 2001 – 2004 in the Northern San Joaquin Valley.

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